

**BARNES & THORNBURG LLP**

11 South Meridian Street  
Indianapolis, Indiana 46204  
(317) 236-1313  
(317) 231-7433 Fax

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

<i>Customer No.:</i>	23643	}
<i>Group:</i>	3749	
<i>Confirmation No.:</i>	3387	
<i>Application No.:</i>	10/719,423	
<i>Invention:</i>	METHOD OF MIXING HIGH TEMPERATURE GASES IN MINERAL PROCESSING KILNS	}
<i>Applicant:</i>	Eric R. Hansen et al.	
<i>Filed:</i>	November 21, 2003	
<i>Attorney</i> <i>Docket:</i>	204560-73806	
<i>Examiner:</i>	Jiping Lu	}

**ELECTRONICALLY  
SUBMITTED ON:  
March 19, 2010**

**REQUEST FOR REHEARING**

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This Request for Rehearing is submitted under 37 C.F.R. § 41.52 in response to the Decision on Appeal dated January 19, 2010 (hereinafter the “Board’s decision”). This Request for Rehearing is timely filed within the two-month time period for reply specified in Section 41.52(a)(1).

Appellants respectfully submit that the Board misapprehended or overlooked certain key points in reaching its decision, which Appellants will state with particularity below.

## **REMARKS**

Appellants respectfully submit that the Board misapprehended or overlooked certain key points when the Board affirmed the rejection of claims 1-18 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 3,584,850 issued to Brandvold (hereinafter “Brandvold”) in view of U.S. Patent No. 5,413,476 issued to Baukal, Jr. et al. (hereinafter “Baukal”). In particular, Applicants respectfully assert that:

I. the Board’s decision modified the basis of the rejection of claim 1-18 such that the Board’s analysis constituted a new ground of rejection, and

II. the Board’s decision misapprehended or overlooked the basic operation of Brandvold’s kiln in order to find the claimed invention obvious.

### **I. THE BOARD’S ANALYSIS MODIFIED THE BASIS OF THE REJECTION OF CLAIMS 1-18 AND CONSTITUTES A NEW GROUND OF REJECTION.**

Even when an examiner’s rejection has been sustained, the Board of Patent Appeals and Interferences has declared a new ground of rejection. *See Ex parte Rogers*, 27 USPQ 2d 1738, 1744 (Bd. Pat. App. & Int. 1992). In *Ex parte Rogers*, the Board sustained the examiner’s rejection of claim 21 under 35 U.S.C. § 112, first paragraph, but announced its conclusion as a new ground of rejection. *Id.* The *Rogers* Board stated that “[r]ecognizing that our basis for sustaining the rejection of claim 21 is different in thrust than stated by the examiner, we shall denominate the same a new ground of rejection. . . .” *Id.* In the case at hand, Appellants respectfully submit the Board’s basis for sustaining the rejection of claims 1-18 is “different in thrust than stated by the examiner,” and Appellants ask the Board to denominate the same as a new ground of rejection.

On pages 11 and 12 of the Board’s decision, the Board found that

One of ordinary skill in the art would understand that when incorporating Baukal’s teachings into the device of Brandvold, it would not be necessary to incorporate the specific location of the secondary air injection of either reference as Appellants suggest. Combining the *teachings* of references does not mandate combination of their specific structures. *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973). One of ordinary skill in the art would recognize that, while the location of the injected oxygen may affect NOx emissions, reducing the oxygen to fuel ratio in the burner could reduce NOx emission independent of the location of the injection. See Fact 9. Furthermore, one of ordinary skill in the art would recognize that the location of the secondary air need not be confined to Brandvold’s tuyere location. One of ordinary skill in the art would understand

how to properly locate the injected air in order to implement Baukal's teachings.

Even if a location proximate the flames were required as Appellants suggest, such a location would still meet the claim which merely requires introducing additional combustion air between the vessel's ends.

(emphasis added). Respectfully, it was the Examiner, not Appellants, who suggested injecting Baukal's secondary air stream through Brandvold's tuyere 24e location. Indeed, Appellants' arguments set forth over the course of five years prosecution were made in response to the Examiner's proposed arrangement. As detailed below, the Examiner's rejection of claim 1-18 was and always has been premised on attempting to adapt Baukal's technique to the specified structure of Brandvold's kiln. In concluding it would have been obvious to modify Brandvold's kiln to reach the claimed invention, the Board's decision departed from the rejection of record and, in that way, the Board's decision constitutes a new ground of rejection.

The Examiner's basic rationale is repeated in a number of Office Actions. In the Office Action dated June 15, 2005, the Examiner stated in the relevant part that

Brandvold shows a mineral lime (CaO) processing inclined rotary kiln 12 with a lower combustion air end 14b and an upper material feed end 14a, 18, 20d. An air inlet opening 24e is located between two ends. . . . Baukal illustrated the importance and the desire to have two stage combustion, e.g. sub-stoichiometric and super-stoichiometric [sic] combustion in order to maximize the efficiency [sic] fuel efficiency and reduce pollutants. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to operate kiln of Branvold [sic] with the combustion rate at sub-stoichmetric ratio at the lower end and super-stoichmetric at the upper end as taught by Baukal in order to obtain complete combustion for clear air exhaust.

(emphasis added). As highlighted in the passage quoted above, the Examiner's rejection was premised on using "air inlet opening 24e" as the injection point for additional air so as to create "super-stoichmetric at the upper end" of Brandvold's kiln. In that way, the rejection required a person of ordinary skill to attempt to adapt Baukal's technique while keeping the specified structure of Brandvold's kiln the same.

In Appellants' Reply to the June 15, 2005 Office Action, Appellants based their arguments on that understanding. On pages 11 and 12 of the Reply dated November 15, 2005, Appellants stated that

Even if, for arguments sake, one of ordinary skill in the art had the general desire "to obtain a complete combustion for clean air exhaust" in regard to Brandvold's kiln, the Examiner has failed to point to any teaching, motivation, or suggestion as to how such a general desire would lead to the specific combination of the

combustion process of Baukel with Brandvold's kiln. This is true for a number of reasons. Most importantly, as discussed in detail throughout Baukel, the combustion system of Baukel will not function in the kiln of Brandvold as purported by the Examiner. Indeed, the secondary oxygen of Baukel must be introduced into the flame NOT at some location tens, if not hundreds, of feet away as proposed by the Examiner. . . . As pointed out at col. 1, lns. 8-13 of Brandvold, the nominal size of a rotary kiln is **450 feet**, with the air inlet 24e being located on the other end of the kiln from the flame. In other words, air introduced through the air inlet 24e of Brandvold's kiln is in no way being directed into the visible flame of the kiln's burner. Baukel's flame system will not function in such conditions. As such, no one skilled in the art would be motivated to make such a combination since it would simply wouldn't work.

(emphasis in original). Those arguments made it clear that Appellants understood the rejection to require introducing additional air through the air inlet 24e of Brandvold's kiln. At that point, the Examiner could have modified or clarified the rejection and indicate that the rejection was based on something other than using the "air inlet opening 24e" of Brandvold as the injection point for the additional air stream. Yet in the next Office Action, dated February 8, 2006, the Examiner merely reiterated the original rejection and did not further distinguish or modify the rejection.

On page 12 of that Office Action, the Examiner responded to Appellants' arguments by stating that the

On pages 10-13 of the Remarks, the applicant argued the 35 USC 103 rejection under Brandvold and Baukal is improper for lack of teaching and motivation. The examiner disagrees. Brandvold patent shows a mineral lime (CaO) processing included rotary kiln 12, a lower combustion air end 14b, an upper material feed end 14a, 18, 20d, an air inlet opening 24e located between two ends. . . . Baukal illustrated the importance and the desire to have two stage combustions, e.g. sub-stoichiometric and supper [sic] stoichiometric in order to maximize the efficiency [sic] fuel efficiency and reduce pollutants. Therefore, in view of the combined teachings of the references for one skilled in the art, it would have been obvious to operate [the] kiln of Brandvold with the combustion rate at sub-stoichiometric ratio at the lower end and super-stoichiometric at the upper end as taught by Baukal in order to obtain complete combustion for clear air exhaust.

(emphasis added). Appellants note that the Examiner did not disagree with Appellants' characterization of the rejection; instead, the Examiner took issue only with the Appellants' conclusion. Presumably, the Examiner realized that Brandvold's kiln would not be operational if the location of its air inlet 24e was moved closer to the flame; indeed, removing or moving air

inlet 24e will completely disrupt the ability of the kiln to produce the desired product because the processed minerals would no longer be properly cooled in the kiln's drying zone.

The record therefore shows that the rejection was premised on trying to adapt Baukal's technique to Brandvold's specified structure. Per the Examiner's statements, the Examiner sought to adapt Baukal's technique to Brandvold's kiln to create sub-stoichiometric conditions in the lower end of the kiln while introducing a secondary air stream through the air inlet opening 24e to create super-stoichiometric conditions at the upper end of Brandvold's kiln. On the basis of the record, Appellants reasonably directed their arguments to countering and pointing out the reasons why a person of ordinary skill would not attempt to adapt Baukal's technique for use in Brandvold's kiln.

In affirming the rejection, the Board stated that "it would not be necessary to incorporate the specific location of the secondary air injection of either reference" and further stated that "one of ordinary skill in the art would recognize that the location of the secondary air need not be confined to Brandvold's tuyere location." Board's decision, at 11-12. As outlined above, those statements are at odds with the basis of the Examiner's rejection and represent a departure from the rejection of record. Rather than finding it obvious to adapt Baukal to the disclosed structure of Brandvold's kiln (i.e., injecting additional air through air inlet 24e) as proposed by the Examiner, the Board's conclusion is based on modifying Brandvold and Baukal to arrive at the claimed invention. Indeed, under the analysis set forth in the Board's decision, a person of ordinary skill would purportedly find it obvious to make a number of possible modifications, including:

- (i) Moving Brandvold's air inlet 24e to a location proximate to the flame** ("[I]t would not be necessary to incorporate the specific location of the secondary air injection of either reference. . . .");
- (ii) Adding an additional air inlet at the bottom of Brandvold's kiln, proximate to the flame, to implement Baukal's technique** ("One of ordinary skill in the art would understand how to properly locate the injected air in order to implement Baukal's teachings."); or
- (iii) Eliminating Baukal's injection of secondary air** ("[W]hile the location of the injected oxygen may affect NOx emissions, reducing the oxygen to fuel ratio in the burner could reduce NOx emission independent of the location of the injection.").

Each of the modifications suggested by the Board's decision represents a significant departure from the rejection of record and is very different from the approach proposed by the Examiner. In effect, the extent and type of modifications suggested by the Board's decision imply that the rejection of record was inadequate and the Board was therefore compelled to outline a new basis of rejection. Yet Appellants have not had an opportunity to address any of the Board's new basis.

As set forth in greater detail below, Appellants respectfully believe the Board's decision overlooked or misapprehended some basic aspects of kiln operation and Baukal's technique to reach its conclusion. In this Request, however, Appellants are limited by Section 41.52 to the arguments and evidence relied on previously in the appeal. As such, by not designating a new ground of rejection, the Board's decision makes *final what is effectively an initial, de novo rejection* and denies Appellants the chance to set forth arguments and evidence to show where the Board's analysis is in error. In that way, the Board's decision unreasonably punishes Appellants for not anticipating an analysis of obviousness that was never set forth in the record. Respectfully, the Board's *de novo* final rejection has cut-off prematurely the back and forth conversation required to establish the understanding of a person of ordinary skill through the presentation of evidence and argument. The current record simply does not provide a full airing of the new issues raised by the Board's decision.

In a recent decision, the Board of Patent Appeals and Interferences reminded practitioners that the Board "reviews the obviousness rejection for error *based upon the issues identified by appellant, and in light of the arguments and evidence* produced thereon." *Ex parte Frye*, Appeal No. 2009-006013, slip. op at 9 (Bd. Pat. App. & Int. 2010) (emphasis added). Here, the record clearly shows that Appellants appropriately presented arguments and evidence to counter the rejection as it appeared on the record. The Board's decision affirmed the Examiner's rejection of claims 1-18 on a distinctly different basis than the one repeatedly asserted by the Examiner. The rationale set forth in the Board's decision departed significantly from the rejection of record and effectively created a new rejection. Because the Board's basis for sustaining the rejection of claims 1-18 is "different in thrust" from the one put forth by the Examiner, Appellants respectfully ask the Board to designate a new ground of rejection so that Appellants have the opportunity to present evidence and arguments showing why the rejection of claims 1-18 remains flawed.

**II. THE BOARD'S ANALYSIS MISAPPREHENDED OR OVERLOOKED THE BASIC OPERATION OF BRANDVOLD'S KILN.**

Appellants respectfully assert that the Board's decision overlooked or misapprehended some basic aspects of Brandvold's kiln to find that claims 1-18 are rendered obvious by the proposed combination of Brandvold and Baukal. However, because Appellants are limited to the arguments made and the evidence relied on previously in the appeal, Appellants are prevented from presenting a complete reply to the analysis of obviousness set forth in the Board's decision. Nevertheless, Appellants submit that the Board's decision, at a minimum, overlooked or misapprehended the following two aspects:

- (i) the operation of Brandvold's kiln dictates locating the air tuyeres 24e between the drying zone and the preheating zone; and
- (ii) injecting additional air directly into the flame would decrease thermal efficiency and increase the amount of NOx produced.

(i) *The operation of Brandvold's kiln dictates the location of the air tuyeres 24e.*

On pages 11 and 12 of the Board's decision, the Board stated that

One of ordinary skill in the art would understand that when incorporating Baukal's teachings into the device of Brandvold, it would not be necessary to incorporate the specific location of the secondary air injection of either reference. Combining the *teachings* of references does not mandate combination of their specific structures. *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973).

(emphasis added). Appellants respectfully assert that the above-quoted passage overlooked an important *teaching* of Brandvold, which emphasized the need to *specifically* locate the air tuyeres 24e between the drying zone and the preheating zone. If that teaching had been properly considered in the Board's Section 103 analysis, Appellants respectfully assert that the Board would have recognized that a person of ordinary skill would be led away from moving the air tuyeres 24e to a position proximate to the flame and within the reaction zone of the kiln.

Brandvold discloses at col. 6, lines 55-75 that

Cooling means 24 (FIGS. 1, 3) communicating with the drying zone DZ mixes a cooling fluid, such as ambient air, with the heated fluid to limit the temperature in the drying zone DZ below about 700°F so that the raw material pellets 10 will not explode due to rapid heating to a deleteriously higher temperature about 700°F. .

..

As shown in FIGS. 1, 3 the cooling means 24 has a stationary shroud member 24a surrounding the shell 14c of the rotary kiln 14, which shroud member 24a is connected through a valve 24b by an inlet pipe 24c to the atmosphere. . . . In order to admit cooling air into the shell 14c of the rotary kiln 14, a plurality of (for example four) tuyeres 24e (FIGS. 1, 3) are disposed in equispaced relationship on the shell 14c. The tuyeres 24e are arranged to spiral the incoming cooling air to rapidly mix the cooling air with the heating fluid.

(emphasis added). The Board's decision appears to have overlooked the above-quoted passage. Brandvold teaches using the air tuyeres 24e in a controlled drying process where air is permitted to advance through the tuyeres to cool the raw material pellets and prevent the rapid heating in the drying zone of the kiln. Moving the air tuyeres 24e away from the drying zone would destroy the kiln's ability to regulate and maintain the temperature of the raw material pellets. Instead of having a controlled heating process, the temperatures in the drying zone of the resulting device would be completely unregulated. Thus, contrary to the assertion that "it would not be necessary to incorporate the specific location of the secondary air injection of either" Brandvold or Baukal, a person of ordinary skill would understand that the air tuyeres 24e must remain at or near the drying zone of Brandvold's kiln; to do otherwise would create a device completely unsatisfactory for regulating the temperature of the raw material pellets in the kiln. In that way, a person of ordinary skill would simply be led away from moving the tuyeres 24e to the reaction zone of Brandvold's kiln.

The Board's decision overlooked or misapprehended the role played by the air tuyeres 24e. If the tuyeres 24e were repositioned as suggested by the Board's decision, the tuyeres 24e would no longer provide to the drying zone the cooling air necessary to limit the temperature to below about 700°F. Given that clear *teaching* of Brandvold, Appellants respectfully submit that a person of ordinary skill would find it necessary to incorporate the specific location of the secondary air injection disclosed in Brandvold. Thus, even if one were to somehow combine Baukal and Brandvold, the kiln resulting from that combination would include the tuyeres 24e positioned specifically as disclosed in Brandvold.

Appellants therefore respectfully submit that the Broad's analysis overlooked or misapprehended Brandvold's teaching that its kiln requires locating the air tuyeres 24e at the drying zone.

(ii) *Injecting additional air into the flame would decrease the thermal efficiency of Brandvold's kiln and thereby increase the amount of NOx produced.*

On page 12 of the Board's decision, the Board stated

Furthermore, one of ordinary skill in the art would recognize that the location of the secondary air need not be confined to Brandvold's tuyere location. One of ordinary skill in the art would understand how to properly locate the injected air in order to implement Baukal's teachings. Even if a location proximate the flames were required as Appellants suggest, such a location would still meet the claim which merely requires introducing additional combustion air between the vessel's ends.

Appellants understand from the above-quoted passage that the Board believed it to be obvious to implement any form of two-stage combustion arrangement in Brandvold's kiln, including those that use a secondary stream of ambient air. Appellants respectfully assert that the above-quoted passage overlooked an important *teaching* of Brandvold, which requires the temperature in the reaction zone or sintering zone (RZ) of the kiln to be about 2,580°F. See Brandvold, col. 8, lines 7-10. That temperature is a critical operating requirement of Brandvold's kiln, and Brandvold emphasizes that one object of its invention is to "make it possible to maintain the desired sintering zone temperature with less fuel." Brandvold at col. 3, lines 30-32. Introducing an ambient air stream into the reaction zone of Brandvold's kiln will have an adverse effect on thermal efficiency and will actually increase the fuel used to maintain the sintering zone temperature.

It is well known that injecting ambient air into a flame lowers the temperature of the flame and thereby reduces the amount of NOx produced *per quantity of fuel*. However, focusing exclusively on this benefit overlooks Brandvold's requirement that a temperature of 2,580°F be maintained in the reaction zone. Because introducing ambient air into the flame lowers the flame temperature, the amount of fuel and the amount of time required for Brandvold's process will actually increase in order to maintain the required temperature in the reaction zone. In that way, the additional ambient air stream in the reaction zone functions just like any other *air leak with an associated heat loss*. The training and indoctrination of a person of ordinary skill tells him to eliminate air leaks and avoid the associated heat loss; as such, a person of ordinary skill would be led away from this arrangement.

By introducing additional ambient air into the reaction zone, Brandvold's burner will be *less efficient in producing the heat required for Brandvold's process*, despite being more

efficient in NOx reduction *per quantity of fuel*. While the NOx produced *per quantity of fuel* will be reduced by the introduction of ambient air, Appellants respectfully submit that the *total* amount of NOx produced will actually increase because the *total fuel* and the *total time* required to operate Brandvold's kiln must increase in order to maintain the temperature. In other words, *any marginal benefit that is gained by the introduction of ambient air would be more than offset by the loss of thermal efficiency.*

Appellants therefore respectfully submit that the Broad's analysis overlooked or misapprehended the challenges associated with implementing two-stage combustion in Brandvold's kiln. At least for the reasons set forth above, a person of ordinary skill would be led away from implementing two-stage combustion with ambient air in Brandvold's kiln.

*(iii) Conclusion to Section II.*

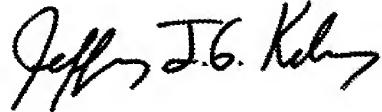
Appellants respectfully assert that the Board's decision overlooked or misapprehended some basic aspects of Brandvold's kiln to find that claims 1-18 are rendered obvious by the proposed combination of Brandvold and Baukal. For the reasons set forth in the Appeal Brief dated July 31, 2007, the Reply Brief dated February 29, 2008, and for those set forth herein, Appellants respectfully urge the Board to reverse the rejection under 35 U.S.C. § 103(a) of claims 1-18.

In this Request, Appellants have attempted to highlight only some of the aspects overlooked or misapprehended in the Board's decision using the existing record; if given the opportunity, Appellants would submit additional arguments and evidence for the Board to consider. For example, if given an opportunity, Appellants would submit a short primer on the differences between kiln operation and boiler operation and, in particular, the difference between thermal NOx and flame NOx to provide the Board with a better factual understanding as to why the Board's analysis is in error. Appellants respectfully ask the Board for that opportunity, which the interests of equity and of merely having a complete record would seem to require.

**III. CONCLUSION**

For the reasons set forth above, Appellants urge the Board to grant this request for rehearing. Appellants hereby respectfully solicit action to that end.

Respectfully submitted,



/ \_\_\_\_\_ /

Jeffrey T.G. Kelsey  
Attorney Reg. No. 63,696  
11 South Meridian Street  
Indianapolis, Indiana 46204-3535  
Telephone: (317) 231-6412  
Fax: (317) 231-7433